

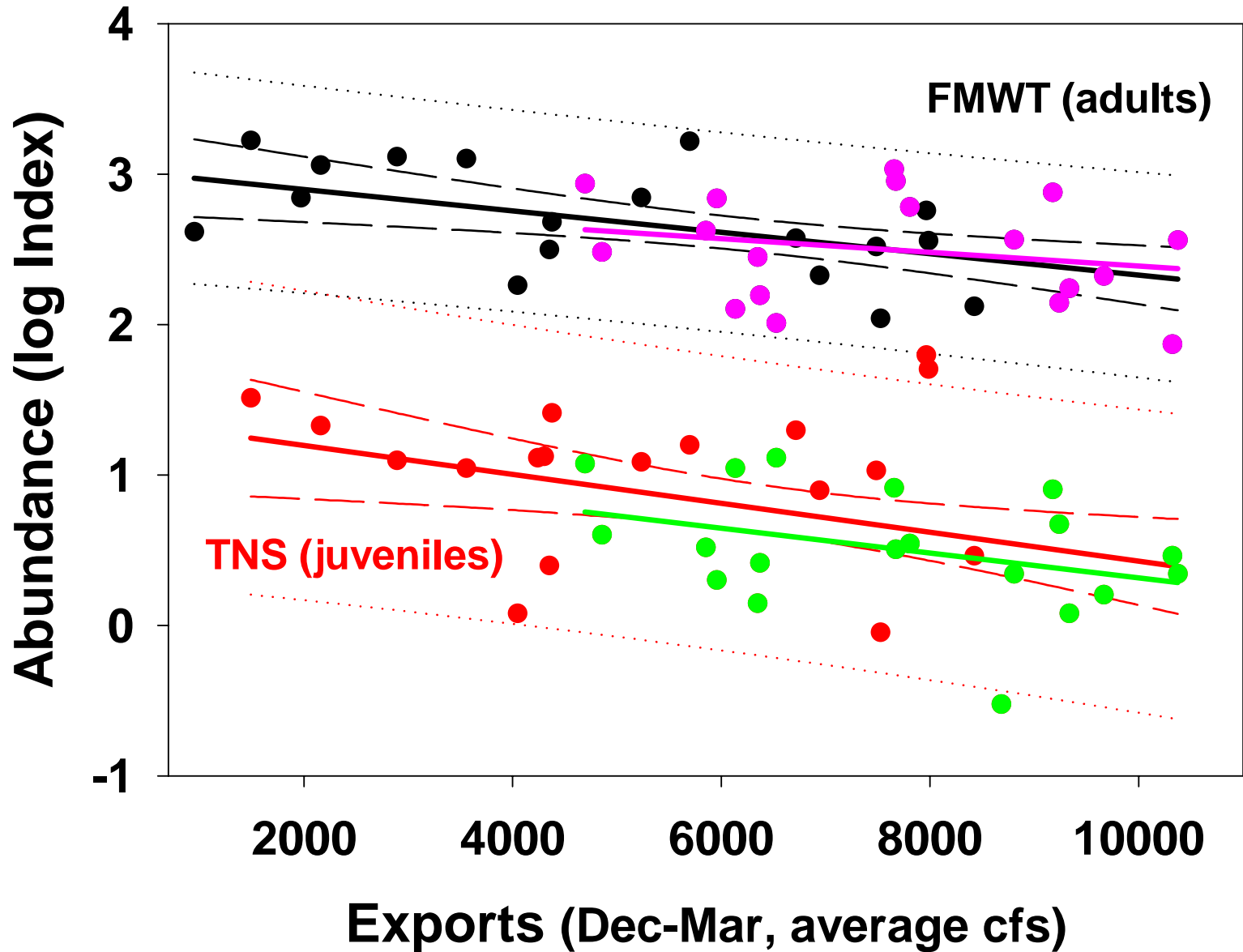
Another Perspective on the EWA

Putting the EWA Into Context in a Changing System

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Effects of winter exports on delta smelt abundance



Closing Thoughts *(from 2005)*

- **These analyses are incomplete;**
- **Many other variables should be tested;**
- **Identify the mechanism(s) for effect of exports on delta smelt abundance**

But they have implications for:

- **Delta smelt protection and recovery;**
- **Evaluation of the effects of present and future water management operations on delta smelt; and**
- **Use and utility of the EWA**

Research efforts during past year relevant to the EWA and water management ops:

- **Herbold et al. 2005 (exports, salvage)**
- **Guerin et al. 2005, 2006 (outflow, salinity, delta smelt abundance)**
- **Manly 2006 (statistical review)**
- **Simi & Ruhl, 2005; Ruhl et al. 2006, Smith et al. 2006 (Delta hydrodynamics, salvage)**
- **Feyrer et al. 2005, 2006 (habitat quality index)**
- **Grimaldo et al. 2006; Van Ark & Grimaldo 2006 (export operations, entrainment, salvage)**
- **Bennett et al. 2006 (exports, delta smelt population dynamics and abundance)**
- **Chotkowski and Manly 2006 (regime shifts, population abundance)**
- **Miller 2005, Mongan et al. 2006 (delta smelt abundance and prey co-occurrence)**

General conclusions relative to the EWA and water management operations:

1. Exports do matter

- Exports = source of direct mortality
- Exports = component of overall water management (e.g., in relation to inflows)
- Exports = indicator of water management (e.g., in-Delta hydrodynamics)

2. Inflows and outflows matter too

3. Effects are seasonal

4. Multiple Mechanisms

- Direct entrainment loss (salvage=poor estimate of loss)
- Hydrodynamic alterations
- Habitat degradation

5. Mechanisms differ seasonally

- **Exports (magnitude, season, concurrent flow conditions)**
- **Delta inflow (e.g., San Joaquin v Sacramento River inflows)**
- **In-Delta hydrodynamics (e.g., Old and Middle River flows)**
- **Delta outflow (salinity, X2)**

How have these factors changed over time?

“Context”

Exports have increased

Increase in SWP+CVP exports
1996-2000 → 2001-2005

Annual: 12%

621 TAF

Winter: 49%

732 TAF

Spring: 5%

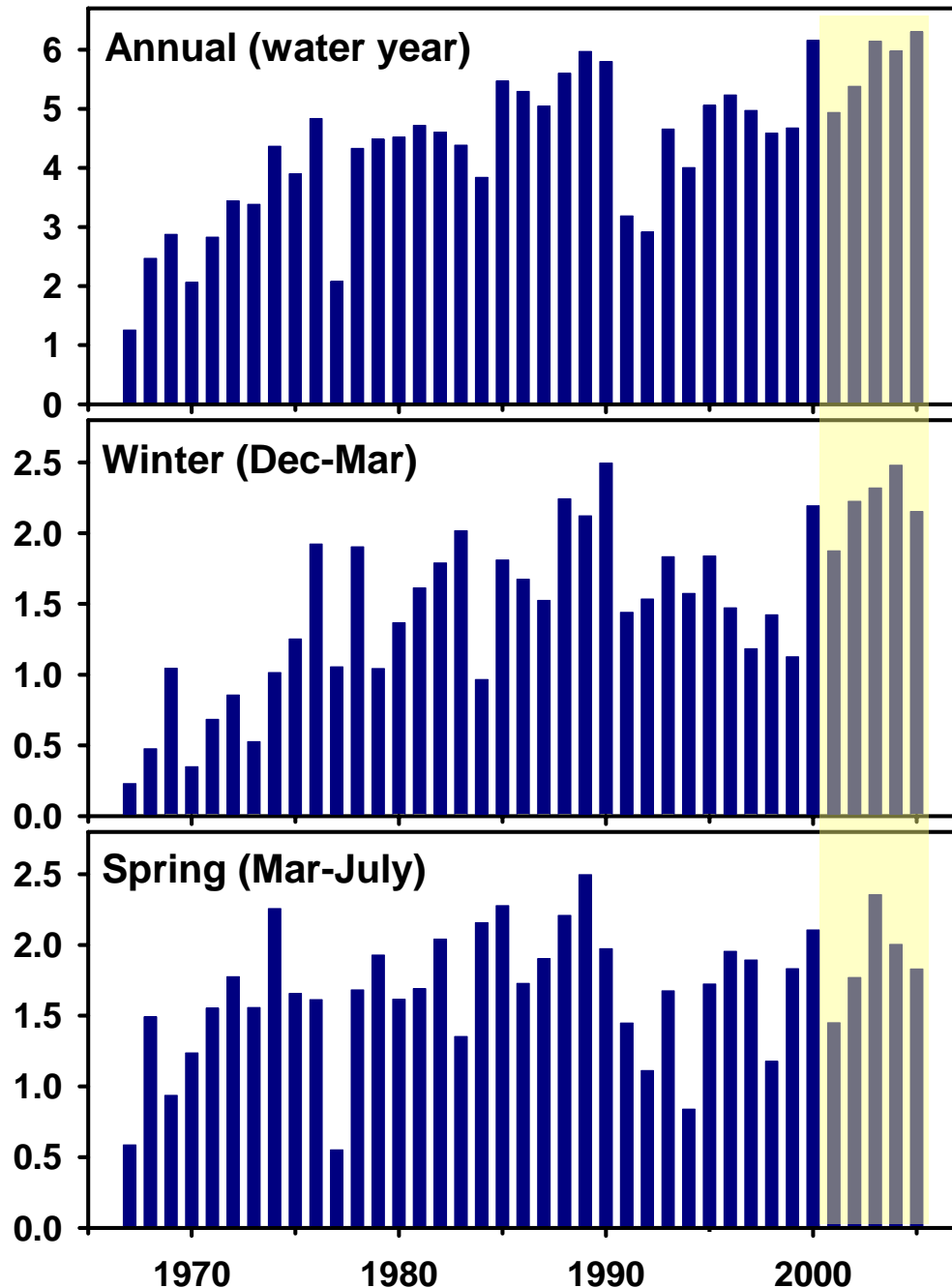
89 TAF

compared to

EWA expenditures:

270 TAF av. (124-348 TAF)

Exports (SWP+CVP, million acre-feet)

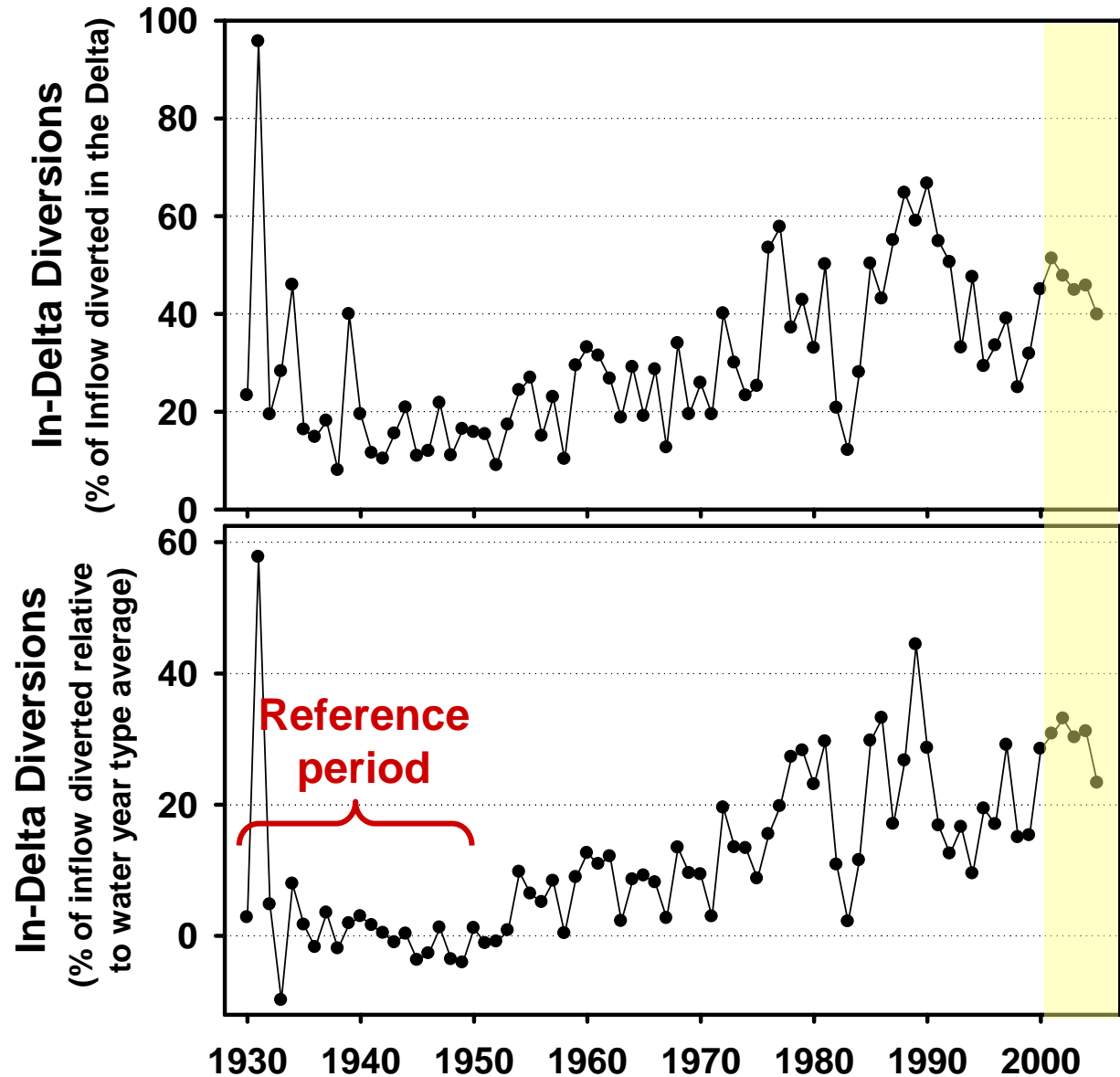


**Total Delta
diversions in
relation to
inflow have
increased**

**% of total
Delta inflow
diverted:**

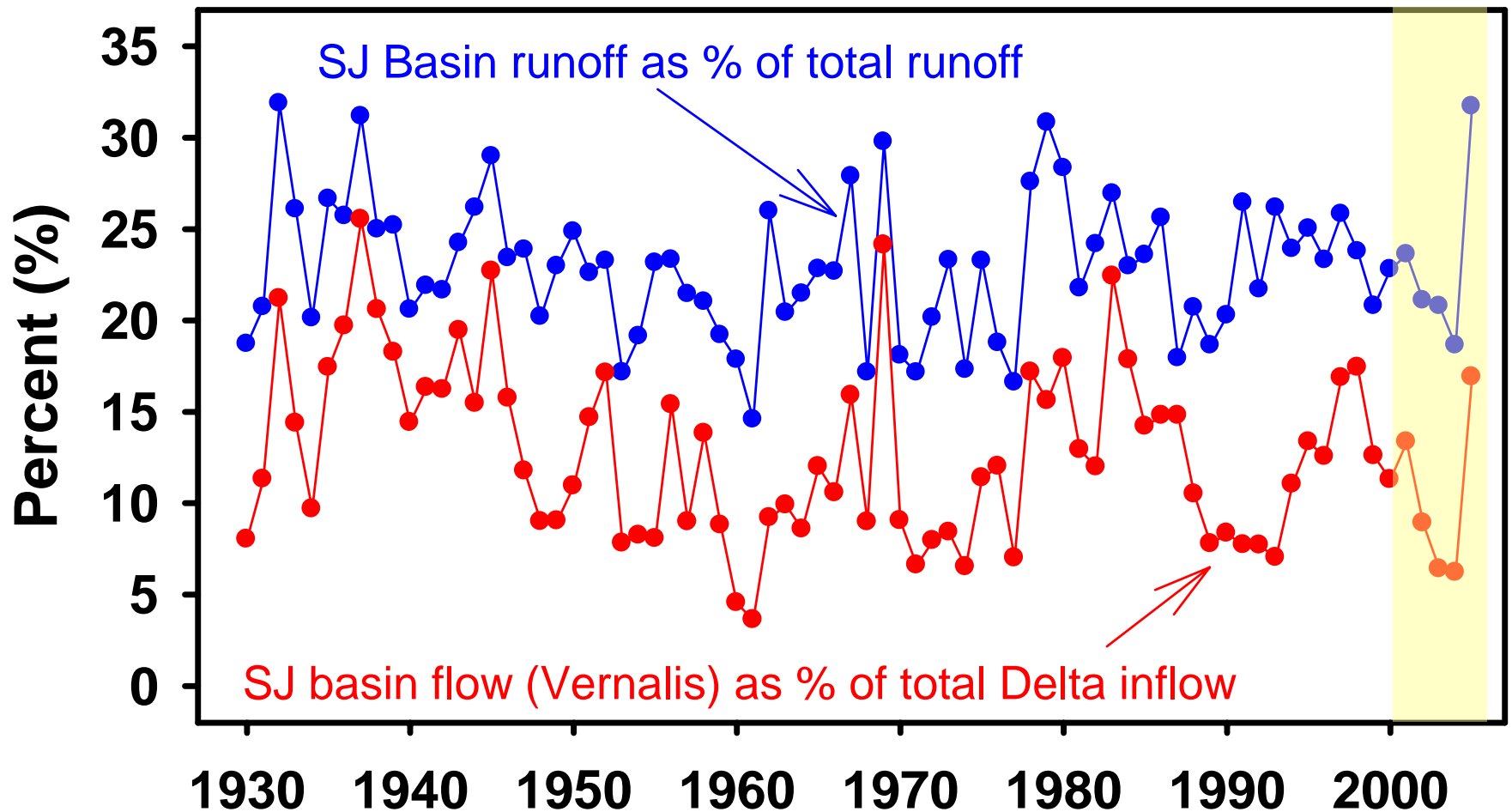
**1996-2000:
34%**

**2001-2005:
46%**

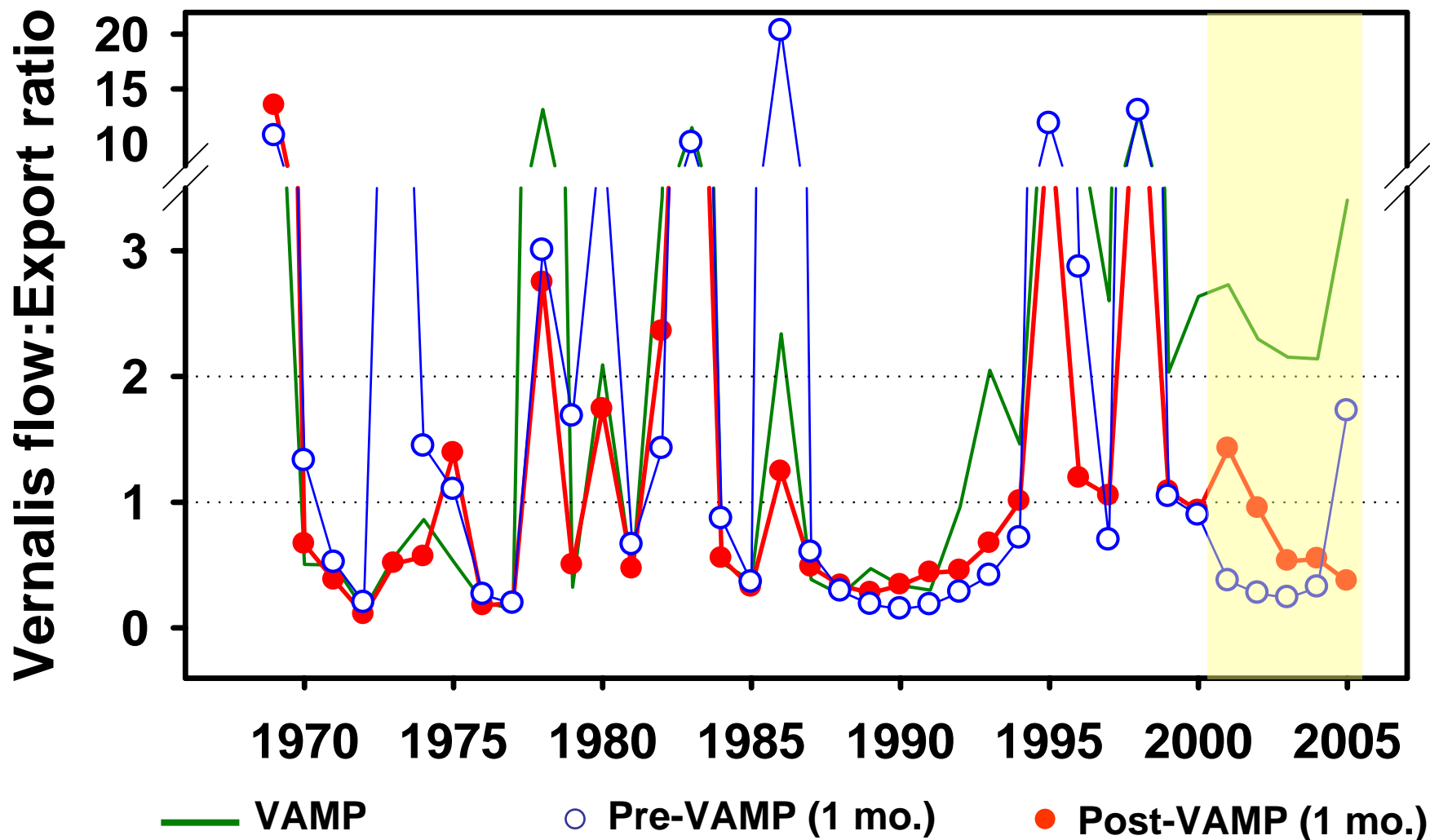


Freshwater inflow from the San Joaquin basin has decreased

Inflow from SJ Basin as % of total inflow:
1996-2000: 14.1% 2001-2005: 10.3%



SJ flow:export ratio conditions before and after the 31-day VAMP are poor and worsening

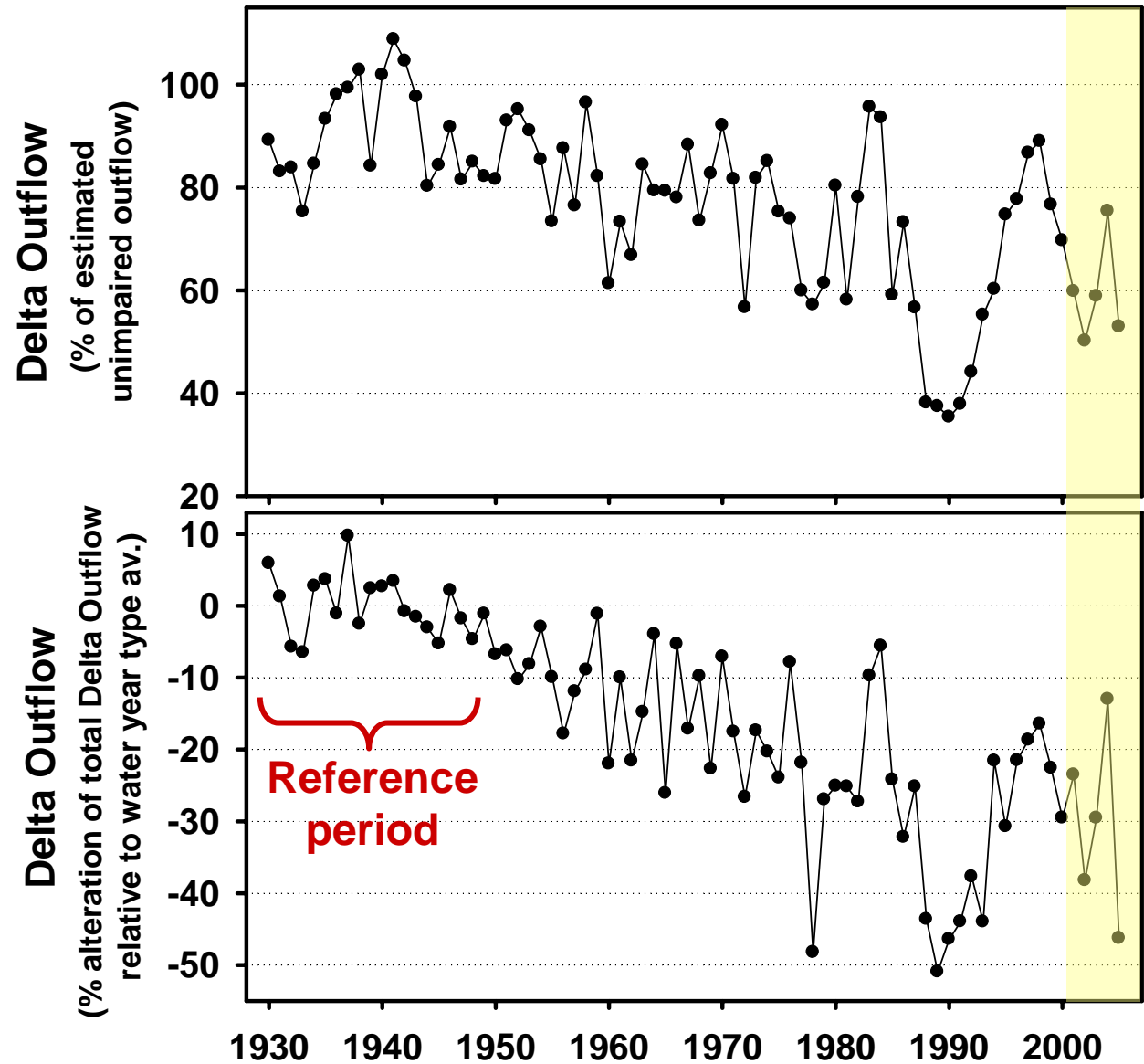


**Delta outflow
has
decreased**

**Delta outflow
as % of
unimpaired
outflow:**

**1996-2000:
79%**

**2001-2005:
59%**



Where does the EWA fit in?

- **EWA is small in relation to other concurrent changes in water management operations in the system**
- **EWA size, flexibility and geographic scope are decreasing**
- **Understanding of meaningful “triggers” for EWA actions is improving**
- **EWA actions and use are contributing to increased intensity of adverse water management operations that may be related to population declines of some target species**

How do we evaluate the EWA?

EWA objective: Protect fish, contribute to recovery

Performance measures or Indicators:

- 1. None identified by Implementing Agencies**
- 2. Delta smelt, SJ Chinook salmon populations down**

Conclusions:

- 1. Effects of EWA actions = extremely difficult to evaluate given large-scale, concurrent changes in exports and other water management operations.**
- 2. Short duration, small scale changes in exports implemented by the EWA will have little effect on entrainment, hydrodynamics and habitat conditions that science indicates are the variables important to fish.**

How do we evaluate the EWA?

EWA objective: No uncompensated delivery reductions, improve water supply reliability

Performance measures or Indicators:

1. None identified by Implementing Agencies
2. Delta exports significantly higher, no reported reductions in deliveries

Conclusions:

1. EWA has met this objective.
2. EWA has facilitated increases in Delta exports compared to pre-EWA conditions.

How do we evaluate the EWA?

EWA objective: Reduce conflict

Performance measures or Indicators:

1. None identified by Implementing Agencies
2. Recommendations for EWA actions rejected or modified with increasing frequency
3. Decisions not to use EWA for implementing actions hypothesized to provide benefits because limited EWA resources

Conclusions:

1. EWA's limited size, flexibility, and geographic scope restrict its ability to implement actions to reduce adverse effects of water management operations on fish and habitat.
2. Reductions or failure to implement complementary environmental water programs increase pressure on EWA.
3. EWA's ability to meet this objective is eroding.

Are the objectives of the EWA the right ones?

Is the EWA the right tool?

What is the EWA of the Future?

- **Size**
- **Flexibility**
- **Geographic scope (acquisitions and actions)**
- **Dedicated storage**
- **Higher priority in overall water management operations (e.g., Article 21, storage)**
- **Greater integration with other environmental water programs (e.g., B2)**
- **Monitoring and evaluation - performance measures and indicators**
- **Responsive and adaptable to a changing system**